FIRE BEHAVIOR ASSESSMENT TEAM (FBAT)

Operations Guide

2023

DOCUMENT PURPOSE

The purpose of the Fire Behavior Assessment Team (FBAT) Operations Guide is to document standard operating procedures (SOPs) and related program functions for current and new FBAT members and collaborators. This document was created to clarify and outline procedures, roles, and responsibilities of FBAT. This is a living document and updated as necessary. The guide is designed to improve coordination among all members of the team, the host unit, and the Incident Management Teams who are involved with FBAT. Ultimately the goal of this document is to increase the efficiency, coordination, teamwork, and safety of the team and to be a repository of all current SOPs.

MISSION

The Fire Behavior Assessment Team's mission is to (1) improve knowledge about the relationships among fuels, fire behavior, and fire effects; (2) support application of that knowledge for the benefit of fire and land management; and (3) promote firefighter safety and public understanding for current and future generations.

GOALS AND OBJECTIVES

Overall objectives are established through collaboration with fire and land managers (e.g., USFS Regions) and interested research and application groups. Assignment-specific objectives are established in consultation with the host unit or incident management team (IMT) before engagement. FBAT's overall objectives are to:

- Build an archive of coordinated fuels, vegetation, fire behavior, and fire effects measurements useful for understanding the effects of past fires and fuel treatments and for evaluating consumption, emissions, and fire behavior and effects models.
- Support incidents through information delivery and supply data and video useful for improving firefighter safety and public outreach.
- Support wildfire research and application through collaborative projects.

FBAT's current primary objective is to:

- Support development of ecological risk mapping across California mixed conifer forests and improve coverage in Northern California

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HISTORY AND BACKGROUND

The Fire Behavior Assessment Team is a unique fire module that measures pre-fire fuels/vegetation, active fire behavior, and post-fire fuels/vegetation conditions before, during, and immediately after wildfires and prescribed fires. FBAT was founded by Dr. JoAnn Fites-Kaufman, the executive officer of a USFS Enterprise Program team called the Adaptive Management Services Enterprise Team (AMSET). Fites-Kaufman did concept and sensor testing before organizing a Rapid Response team with support from a JFSP grant in 2002. Carol Henson, an AMSET Rapid Response operations leader, coined the name FBAT, a four-letter acronym which is common in fire, similar to FBAN, and describes what the team does. FBAT is currently managed and supported by USFS staff from all deputy areas, but the Enterprise Program continues to provide administrative support from time-to-time and helps FBAT meet objectives through assistance supported by work orders. FBAT increasingly engages with University and federal researchers to develop and further objectives.

PROGRAM MANAGEMENT

FBAT's main goal is to measure fuels, fire behavior, and fire effects on active fires to meet objectives in priority measurement areas (or ecosystems, or fuel types) that are accessible and safe. The team can conduct measurements in any fuel type on wildland fires (planned/prescribed fires, or unplanned fires). FBAT utilizes fire behavior sensors and video cameras to measure direction and variation in rate of spread and fire type (e.g. surface, passive or active crown fire behavior) in relation to fuel loading and configuration, topography, fuel moisture, weather and operations. We measure fuel consumption and fire effects on soils and vegetation and can locate plots in a way that allows us, as we build the archive, to meet research and application objectives. We are prepared to process data and deliver summary reports while assigned to an incident and typically deliver a full report shortly after each incident.

The archive of fuels, vegetation, fire behavior, and fire effects data supports science and management-focused publications. The video and other data are useful for conveying specific information to incident teams, the public, line officers, and firefighters. FBAT can address specific unit objectives, such as effects on archeological, botanical or wildlife habitat resources. The archive has been used to assess fuel consumption models, evaluate fire effects on forest carbon budgets, and provide information for a digital guide to the relationships among fuels, fire behavior, and fire effects in mixed-conifer forests for fire and fuels management staff.

Significant support for FBAT operations (travel and salary) on assignment is provided by IMTs. A collaborative process between FBAT and partners often determines objectives and support for pre-season activities (e.g., data management and analysis, equipment management, instrument design and production, and training).

FBAT MANAGEMENT

FBAT is led by one volunteer (or collateral duty, multi-year) Program Manager (currently, Matt Dickinson) and one volunteer (or collateral duty, multi-year) Assistant Program Manager (currently, Carol Ewell). The Program Manager is responsible to the FBAT Advisory Committee.

FBAT ON ASSIGNMENT

FBAT on assignment includes 6-12 fireline qualified personnel, at least one of whom is Taskforce Leader (TFLD) or higher qualified and serves as the Operations Leader during incident assignments. Everyone on the team is on-call for incident work, as their work and home lives allow.

Advisory Committee

The purpose of the advisory committee is to support FBAT in continually improving its operations and to provide strategic direction towards meeting the information needs of the fire and forest management community. The committee will include members with a wide geographic scope-of-work and with responsibilities in land management, fire operations, and fire science. One or more members of the advisory committee will help interface with FBAN's, LTAN's, and other fire practitioners who use fire behavior decision support systems and can help FBAT set objectives relative to supporting system development. One or more members of the committee will work in fuels management and fire planning and will help FBAT develop objectives for supporting fuels and vegetation management. One or members will be from the science community and will help FBAT improve data collection and observation methods and develop collaborations that leverage the core FBAT data collection. All Advisory Committee members will help FBAT secure in-kind and financial support (e.g., through Regional and Washington Office funding and grants).

Membership:

1. Matt Dickinson, Research Ecologist, Northern Research Station, Advisory Committee Chair
2. Carol Ewell, Fire Planner, Stanislaus NF (R5)
3. Jennifer Anderson, Division Chief Prescribed Fire and Fuels, Yosemite National Park
4. Ali Reiner, USFS Enterprise Program, Fire Ecologist (duty station in R9)
5. Nicole Vaillant, USFS Wildland Fire Research, Development, and Applications (duty station in R6)
6. Scott Dailey, USFS Enterprise Program, Fire Ecologist (duty station in R5)
7. Rich Pasquale, Fuels Specialist, Fremont-Winema NF (R6)
8. Jessica Miesel, Associate Professor, Michigan State University
9. Eric Knapp, Research Ecologist, PSW Research Station (duty station in R5)
10. Bill Coates, Engine Captain, Colville NF (R6)

PRE-SEASON TASKS

Task management

The task list lists current projects and recurrent tasks, who is responsible, progress, and deadlines. The task list is written in Excel and is found in the FireBehaviorAssessmentTeam-External/ProgramManagement/Tasks folder on the FBAT Box drive.

On-Call Database

One member of the Advisory Committee maintains the on-call spreadsheet with IQCS and ordering information. Early each year, well before the western fire season, the database manager emails the people on the spreadsheet who have expressed interest in an FBAT assignment and asks them whether they are interested and available for the coming season and, if so, if their IQCS number, qualifications, dispatch, and contact information are correct and current. The spreadsheet manager identifies those who expressed interest and updates the information as needed. Make sure that there are enough on-callers with interest and qualifications for serving as the FBAT Operations Leader on assignment. All FBAT on-callers (with the exception of those intending to serve as operations leads) should be qualified as Technical Specialist (THSP) based on skills relevant to FBAT operations. Contact FBAT leadership for THSP justification language if needed. More information on qualifications can be found in the FBAT Qualification Standards section, below.

Equipment Management and Preparation

Post-assignment rehab supplies and bulky and older equipment are currently located at Pinecrest Station in the 3rd garage bay managed by the Summit Wildland Fire Module (STF Crew 3). More expensive and heat-sensitive equipment are kept in storage in or near Carol Ewell's office at the STF SO. Older legacy FBAT

supplies are in the attic above Crew 2's space at the Mi-Wwuk district office (e.g., the aerial drop sensors). The gear for assignments is packaged and stored in the "bug room closet" at the SO's office in Sonora. Kit packing lists are provided in the Appendix.

TRAINING

The FBAT program hosts a gear-preparation and training session each year given availability and funding. The objective of this training is to provide experience to the on-call group with FBAT tasks. Training may be coordinated with interested Wildland Fire Modules, though their availability is often limited during fire season due to suppression needs. The training focuses on assignment expectations, plot sampling, data entry, and data analysis. The goal of gear preparation is to make sure that all the equipment is ready to load into the FBAT truck for assignment. The on-call nature of the crew means that people who attend the training and gear-preparation session are often not the same people who go on an FBAT assignment. As such, a lot of plot sampling and other FBAT-specific training has to be completed on assignment. Many of the skills that make a quality FBAT crew member are gained through a variety of other training and experience. For instance, FEMO, FOBS, GISS, etc., skills are useful in making a valuable FBAT crew member.

FBAT members should be doing regular physical training at arduous level to be prepared for assignment (unless they are supporting FBAT remotely).

MOBILE DEVICE UPDATE

In early spring, the FBAT Program Manager or Assistant will update GIS software on tablets. Software will include: Avenza with USFS license, AGOL applications (Collector, Survey123), Google Earth, GAIA.

Android version of Collector: https://play.google.com/store/apps/details?id=com.esri.collector

LAPTOP SOFTWARE

Download and install iButton logger (for soil heating) and MadgeTech (for thermocouple and wind) software. Installation will require administrative privileges (for USFS, call Computer Help Desk).

iButtons: https://www.maximintegrated.com/en/products/ibutton-one-wire/one-wire/software-tools/drivers/download-1-wire-ibutton-drivers-for-windows.html

Choose your operating system (probably Windows 10) and processor (64-bit probably). Download and install.

MadgeTechs: https://www.madgetech.com/software/madgetech-4-software/

Download and install.

National Interagency Fire Enterprise Geospatial Portal is a great resource for mapping current fires, historical fires, other information, and outputting in GIS format: https://egp.nwcg.gov/egp/launchpad.aspx

Request an account.

INTERNET

Good sites for situational awareness:

Enterprise Geospatial Portal - https://egptest.nwcg.gov/egp/default.aspx (my first stop)
NIFC public FTP site: https://ftp.wildfire.gov/ (go to incident specific data for IAPs, maps, etc.)
Inciweb - https://inciweb.nwcg.gov/ (incident information)
Risk Management Assistance: https://wfmrda.nwcg.gov/rma (see the dashboard)
National Incident Coordination Center: https://www.nifc.gov/nicc (check the region/incident you are going to)
Weather satellite sites: Weather.cod.edu/satrad; https://www.goes.noaa.gov/

OUTREACH

In January, the FBAT Program Manager or Assistant will make sure that FBAT's information is updated in the regional mobilization guide. In February, the FBAT Program Manager or Assistant will reach out to regional leadership on objectives for the fire season and ask for their support. As fire season approaches, the Program or Assistant Leader will contact fire and fuels staff in priority National Forests to make sure they are aware of FBAT and request their support in ordering the team during fire season. An FBAT representative will attend the annual regional IMT meeting.

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FBAT ORDERING AND MOBILIZATION

VEHICLES

Currently the 'FBAT truck' is a USFS Stanislaus NF (STF) pickup with a black topper, door number (3831), and is usually parked at the SO in Sonora, CA. Carol Ewell manages the vehicle, contact her with questions. The topper does not lock well, so consider parking it backed up to a fence or pole in places where theft could be an issue. It is expected that if Carol doesn't go on the FBAT assignment (e.g., because she is on another assignment) then a replacement vehicle (e.g., a rental car) would be provided for her use while the FBAT truck it out.

TEAM AVAILABILITY

Given that FBAT membership is a collateral duty and members do not commit to being available, we cannot guarantee complete coverage of the fire season. Availability will be maximized to the extent that we can build the group of on-call members through training and outreach. The on-call database is used to build a team for an assignment.

Often, FBAT will be asked to perform Fuel Treatment Effectiveness Monitoring (FTEM) and other kinds of field work and reporting on fires. Assignments that do not involve FBAT's core pre-, active-, and post-fire monitoring are secondary objectives and acceptance will be agreed upon by FBAT program management. Secondary assignments should not interfere with FBAT readiness to meet its primary objectives. For instance, in late 2019, the Caples Rx Fire escaped containment and the responsible land management unit asked FBAT to conduct a report on fuels, fire behavior and fire effects to assess whether the effects of the wildfire were compatible with objectives. In another example, FBAT performed an analysis of the origins, behavior, and impacts of a fire-generated tornado on a wildfire. Responsibilities for the various aspects of the assignments (e.g., ordering, cost reimbursement, field work, report production) are agreed upon beforehand and may often involve only a subset of the FBAT members who are willing and available.

ASSIGNMENT

Sometimes a request for FBAT is communicated through FBAT members and leads, other times, it's necessary to take the initiative and contact incident and Forest staff after a fire has started. Pre-season outreach is intended to facilitate obtaining assignments.

FBAT QUALIFICATION STANDARDS

FBAT leadership expects everyone working on or near the fireline to have, at minimum, a current FFT2 qualification at the arduous fitness level. Team members who will work primarily at base camp (e.g., on GIS tasks) or who are advising FBAT on cultural resources (e.g., READs, REAFs, ARCHs, or CULS) will be qualified at or above the fitness level required by the position (some positions have a moderate or no fitness

requirement). Refer to National Incident Management System Fire Qualifications System Flow Chart (PMS 308). There are also opportunities for remote support.

FBAT positions on assignment are described below under Roles and Responsibilities on Assignment. The Operations Leader position requires Safety Officer (SOFR), Task Force Leader (TFLD), or higher qualification. An ideal team should have a mix of operations and technical expertise. As much as possible, each on-call member should also have a mix of operations and technical experience. At least two individuals should be qualified at either the crew boss (CRWB) or squad boss (FFT1) level. Other members with less operations experience and qualifications should bring key technical skills to the assignment (i.e. experience in Excel, data management, fuels and tree measurement methods, GIS, technical fire behavior equipment, etc.).

EXPECTATIONS OF FBAT ON-CALL MEMBERS DURING ASSIGNMENTS

- Many FBAT fire assignments are not 14 days long. If an assignment is winding down, there may be opportunity for a member to be re-assigned to the incident in another capacity. Re-assignment is at the discretion of the FBAT Operations Leader based on the FBAT tasks remaining and the skill set the member brings to the assignment
- There is no guarantee of overtime or hazard pay or 16-hour shifts on FBAT assignments. A member will only be credited with hours worked. Depending on the workload and skill sets, some team members may work different numbers of hours during a shift than others.
- You will be asked to do a variety of duties, some of which you may already have skills at, some of which you will acquire by cross-training with others.
- No one is asked to volunteer their time, if you can't get all your tasks done in 1 shift, you need to communicate that.
- FBAT team members are required to comply with all standard incident guidelines regarding work-rest ratios.

ORDERING PROCESS

Example text to use on resource order when requesting FBAT Operations Leader and on-call team members.

FBAT Operations Leader

Requesting: Lisa Loncar, USFS NFS, **THSP**, IQCS#1032175. Dispatch: Grand Junction, Tele 970-257-4800. Loncar's cell: 970-355-5623. Needed Date/Time: Sunday 9/8 @ 1800 at ICP. Ideally travel 9/7 and pick up FBAT truck and gear in Sonora, CA 9/8 AM. Special Needs: laptop computer, cell phone/ipad, 4X4 authorized. Justification: Lisa Loncar will provide overhead and safety support to the FBAT team and be the liaison with incident operations. Lisa will help FBAT in other ways as possible. Lisa's THSP fire monitoring experience will be needed by FBAT in the field.

FBAT on-call members

Requesting: Matthew B. Dickinson, USFS R&D, **THSP**, IQCS# 22483. Dispatch: Mid-Atlantic Interagency Coordination Center (PA-MACC), Tele: 740-753-0911 (OH-OIC in transition to PA-MACC, use Ohio contact info). Dickinson's cell 614-556-2271. Needed Date/Time: Sunday 9/8 @ 1800 at ICP. Ideally travel 9/7 and pick up FBAT truck and gear in Sonora, CA 9/8 AM. Special Needs: laptop computer, cell phone/ipad, 4X4 authorized, FBAT instrumentation. Justification: Matt Dickinson is the FBAT Program Leader and will get FBAT resources oriented and serve as a liaison with the IMT. Matt will help with field work, analyze FBAT data, and assist with report preparation

Requesting: Alicia Reiner, USFS Enterprise Program, IQCS# 1026399, **THSP**, New Hampshire NHNECC (603-536-6208), Alicia's cell 530-559-4860. Needed Date/Time: Sunday 9/8 @ 1800 at ICP. Ideally travel 9/8 am or 9/7pm. Special Needs: laptop computer, cell phone/ipad, 4X4 authorized. Follow up work may be completed virtually. Justification: Alicia Reiner was the former FBAT co-lead and has the capacity to serve as a liaison with the IMT and/or CRWB for technical FBAT work as needed. Alicia will collect field data and analyze FBAT data.

Requesting: Barry Kleckler, Wildland Fire Management RD&A, **DIVS**, IQCS# 2000414. Dispatch: Central Oregon Interagency Dispatch Center OR-COC, Tele: 541-316-7700. Kleckler's tele: 541-233-7326. Needed Date/Time: Monday 9/9 @ 1700 at ICP. Special Needs: laptop computer, cell phone/ipad, 4X4 authorized. Justification: Barry will provide backup overhead and safety support to the FBAT team and will participate in planning and plot sampling. Barry's FEMO(t) fire monitoring experience will be needed by FBAT in the field.

MAPS AND GIS UPDATE

Obtain any electronic and paper maps that are appropriate and available. Use EGP and other resources to "scout" historical fires and fuel treatments that offer opportunity for comparing with untreated areas. Create GIS layers for field orientation.

FBAT TRUCK PACKING

Gear is stored in Sonora, CA. FBAT Lead needs to go to Sonora to get the FBAT truck and load gear. See Appendix for list of materials to pack into FBAT truck.

GETTING TO AN ASSIGNMENT

It is the role of dispatch to order and coordinate the mobilization of team members. Provide the necessary information to dispatch and they will do the rest. Try to order everyone at once (vs. multiple emails). Members should be as flexible as possible. After everyone is ordered, make sure that all team members have each other's contact information and that vehicles requirements for the assignment are met in the most fiscally responsible way possible. For use on the fireline, a rental vehicle is required to be a National Emergency Rental Vehicle (NERV). Given the NERV requirement, it may be necessary to coordinate with ground transportation on the incident to ensure that FBAT has enough field-capable vehicles to accomplish its mission.

FBAT ON ASSIGNMENT

The typical rhythm of an FBAT assignment is for leads to scout and gather intel in the first days on assignment, locate space for camp work (trailer, yurt), and then, as the crew arrives, focus intensely on getting as many plots installed as possible. As time allows, pre-fire data are entered during evenings. After plots start burning, plots are pulled and work starts on data tasks and report writing. Finally, the team starts to demob and rehab. As the assignment develops and the pace slows, it is sometimes possible to cut people loose for other work on the incident or to return home, however, completing the FBAT assignment is primary.

SAFETY ON FIRES

The nature of FBAT field work puts crew members in several watch out and complex situations. Plots are ideally placed in areas of unburned fuels where the fire is likely to burn. This generally necessitates that FBAT is working in places where the main fire may not be visible. Additionally, FBAT works in multiple divisions across a fire, and may frequently encounter new areas, resources or situations un-scouted by FBAT. FBAT is not a typical wildland fire resource. Many IMTs will not be familiar with the mission or operational protocols. It is important that FBAT not create a significant additional workload or safety concern for the IMT. Frequent communication and good accountability is paramount. FBAT's call sign has been "Assessment One" to avoid confusion with FBAN when communicating with operations.

The work FBAT crew members complete on the fireline often requires their undivided attention, which can temporarily lower situational awareness. FBAT strives to collect complete and precise data, which can lead to tunnel vision or unnecessarily strong adherence to task completion when fire danger may be increasing. The supervision of FBAT data collection requires oversight, guidance, troubleshooting and decision-making which can detract from situational awareness and lower the effective span of control of the data collection lead.

Additionally, FBAT data collection requires exposure to burned areas which often have snags. Therefore it is required to have a Task Force Leader or higher fireline qualified person assigned for the safety of the crew. This person's sole responsibility is to mitigate the line safety hazards inherent to wildland fire, with constant attention to LCES of the FBAT crew and in alignment or communication of the next higher IMT position (often the DIVS).

Outreach and Education on Assignment

Much of the wildland fire world has never heard of FBAT. All members of the team should have a basic understanding of what FBAT does so that they can explain it to interested parties and answer questions such as:

- What is FBAT?
- What do you do on fires? And Why?
- What are you doing on this assignment?
- How is FBAT funded? How do you join FBAT?

Goal – have a version of this in your head, so you can answer questions on the fly (e.g., in the chow line). Always feel free to incorporate a long term FBAT member or leader in your communications (like Ali, Matt, Carol, Scott, etc.). The FBAT 1-Pager in the Appendix can be posted on the chow line, handed to IMT members, used for pre-season communication, etc.

Roles and Responsibilities on Assignment

FBAT leadership, in coordination with advisory committee and regional, local and Incident Management Team staff establishes goals for the season and for each assignment and communicates those to the team at the initial briefing. Two organizational structures are in place (Figure 1), one for overall FBAT management and the other for assignments. On assignment, the Operations Leader reports to the Operations Section. Communications and information delivery to the IMT are the responsibility of the FBAT Leader and Science Leader.

FBAT Leader: Responsible to FBAT Program Manager

May be responsible for ordering team and equipment (e.g., NERVs). Manages FBAT field group (assigned to the incident for FBAT work) to meet goals during the assignment. Communicates with FBAT Program Manager regularly during incidents. May be required to act as FBAT representative to regional and/ or local administrators to focus incident-specific assessments/measurements on regional/local priority topics and establish contacts for report dissemination. If needed, may perform as Point of contact for GACC and local ECC.

Makes sure that facilities where FBAT can work on data and equipment tasks are available through outreach to National Forest staff or Facilities Unit Leader. Coordinates with IMT, FBAN, and LTAN to prioritize real time assessment and data needs of IMT to help increase firefighter and public safety, when time and list of existing FBAT objectives/expectations allows. Attends daily IMT Plans meeting.

Collaborates with FBAT operations leader to compile daily field mobilization and work location plan.

Collaborates with FBAT science leader to develop data collection plan, report documentation and completion timeline. Provides incident fire assessment report to FBAT Program Manager.

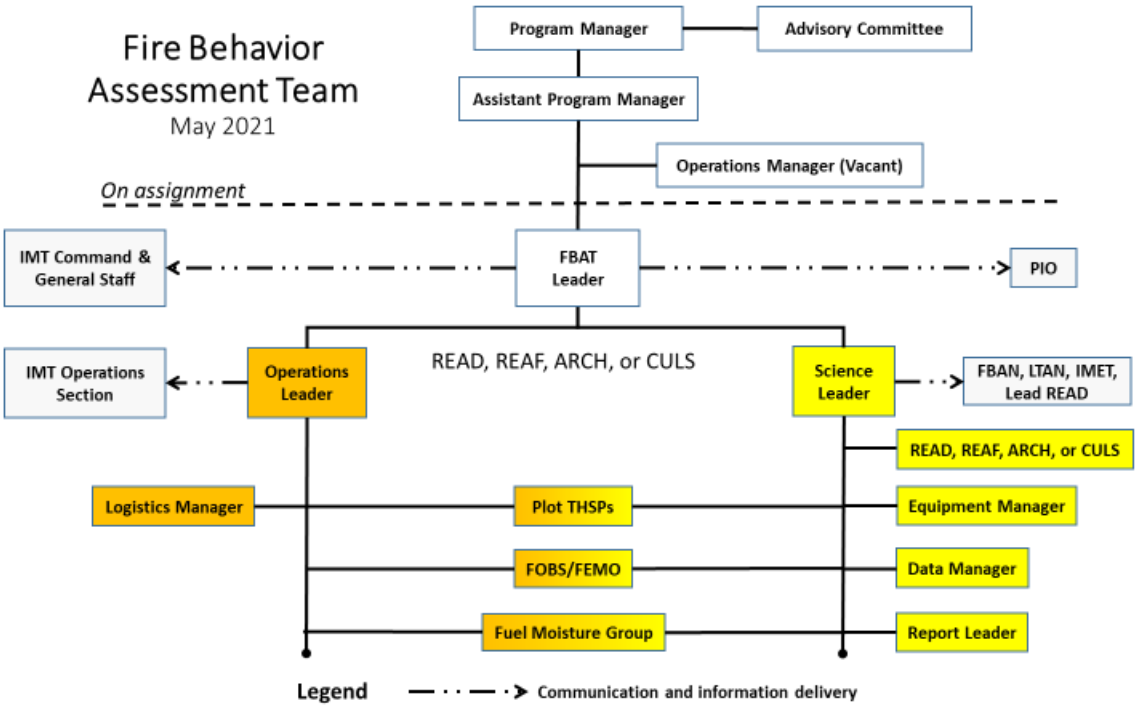

Figure 1. FBAT organizational chart. FBAT organization on assignment is described below the dotted line. Operations responsibilities are denoted by orange (mostly in the field) and science responsibilities by yellow (mostly at camp). There is a blending of responsibilities for FBAT members while in the field doing measurements. In the field, the Operations Leader holds authority for operations and safety.

Operations Leader: Responsible to FBAT Leader

Position requires IQCS qualification of SOFR, TFLD or higher.

Collaborates with FBAT Leader to define daily field mobilization and work location plan. Acts as FBAT liaison to IMT operations unit, coordinating movement throughout the incident area with operations personnel as requested and needed to maintain the safest operations for FBAT and firefighting personnel possible.

Establishes initial check-in and contact with IMT operations unit as early as practical upon arrival to incident. Attends daily incident and division breakout briefings (and pre-briefing if needed) as well as planning briefings if able. Brief and debrief operations personnel as needed.

Responsible for location accountability of all FBAT field going personnel on incident, maintaining fire-line check-in/out protocols. Facilitates daily incident operational and safety briefing with all FBAT personnel. Provides assignment specific safety briefing as dictated by fire and operational conditions and establishes LCES. Frequently ensures adequate communication with FBAT field personnel and IMT operations personnel. Appoints lookouts and/or safety coordinator, as complexity and span of control fluctuate. Debriefs daily with all FBAT personnel as needed.

Performs as Officer in Charge of time and expenditure tracking for FBAT group.

Briefings and AARs:

- AM briefing. Review mission, hazards, ensure everyone understands medical plan for the day and has proper communication frequencies. Document a tailgate safety topic each day.
- PM briefing. After return from the field. Include AAR as needed. Science Leader or FBAT Leader need space to brief on their topics during this briefing.

- End of Assignment AAR. Operations Leader in charge of this, with input by the Science Leader and FBAT Leader. Need to be documented, even in outline format, so we are documenting that we are a learning team.

Science Leader: Responsible to FBAT Leader

Collaborates with FBAT Leader to develop plans for plot locations, methods/types of data to collect, quantity per day, and delineates personnel needed to achieve more than one data collection goal. May act as FBAT representative to IMT LTAN/FBAN/IMET, regarding types of data they would like and oversees the delivery of these data to the incident either in person or by the data manager, daily if possible. Oversees data sheet and file management, data entry/download, post-processing, and file management and may delegate these tasks to a Data manager.

Designates leads for rate of spread, cameras, fuels, fuel moisture data collection, FOBS/FEMO observations, and other data collection squads or leads as needed. Provides data collection expectations to each delegated data collection group leader.

The Science Lead weighs all media requests and may delegate these interviews.

The Science Leader is responsible for completing and delivering the draft and final report in a timely manner. Report completion and delivery is often accomplished after the incident. Report is not considered final until FBAT Program Manager and IMT or host unit point of contact have approved it.

FBAT will not add additional scope or special topics to be covered in the report, without buy-in from the FBAT Program Manager in advance to ensure that the report stays focused on core objectives and is completed in a timely manner.

Early in the assignment, the above leaders will assign squad-bosses for different jobs related to data, gear, camp tasks, plot tasks, as outlined below. Not all jobs will have different squads, or be made of more than 1 person. Sometimes depending on number of folks on the assignment, you have to manage more than 1 task or squad of duties.

Report Leader: Responsible to Science Leader

The goal is to advance the report as far as possible during the assignment. Completing and delivering the report is the responsibility of the Science Leader and FBAT Program Manager (more on this under the Science Leader section).

May be designated to facilitate outlining and development of the report. The Report Leader spearheads and/or complete initial portions of the report including the tables, placing photos in the report, making a map of the plots and fire progression, gathering local RAWS data for comparison (e.g., by fire danger pocket card).

This position should expect to fluctuate between data collection and report development based on quantity of available data to disseminate. Coordinates with and assists the Data Manager as much as possible.

Data Manager: Responsible to Science Leader

Responsible for acquiring hardcopy datasheets, copying datasheets, assisting data collection groups with data entry. Compiles daily data, photo and report for IMT. In coordination with Science Leader, may act as courier to deliver daily documentation to IMT/LTAN/FBAN/IMET. Initializes and sorts dataloggers to field readiness standards.

Coordinates summarizing and putting surface and ground fuels data into tables, running tree data through FVS and putting FVS canopy/stand metrics into tables, validating photo titles, pinpoints fire arrival time-stamps

from ROS sensors, begins and/or completes ROS calculations, makes sure all final datasets (raw and post-processed) are saved onto a master hard drive and backed up before leaving the fire. Coordinates video analysis to extract rate and direction of spread and flame lengths.

This position should expect to fluctuate between data collection and data management based on quantity of available data to disseminate.

The following standard SOPs help maintain full and accurate data on fires:

- One person should be in charge of collecting datasheets in the field and making sure they are fully filled out, photocopied and stored safely. Unless time is limited, review datasheets for completion before pulling transect tapes and leaving the plot to make sure all data are recorded and legible.
- Make copies of datasheets immediately upon returning from field for data security and for use in post-fire plots. This can be a repeat process, such as when just pre-fire data is on the sheets, then when post-fire data is on the sheets. If you have copies of the post fire data, then pre-fire can be thrown away if all notes are added to the new finals (like who entered it, or if questions or highlights were addressed).
- Highlight pre-fire data which is missing and can be collected post-fire (i.e., total tree ht).
- Have one person enter data and another person QA the data because we catch other's people's errors more quickly than our own.

Each time data are entered (e.g., at the end of each day) copy the computer file to the master hard drive. Note the fire and date in the filename so that determining the most recent file is easier.

By the end of each assignment, one set of paper data sheet photocopies and one set of original paper datasheets should all be filed, files organized on the master FBAT data harddrive and copied to the USFS Pinyon/BOX folder for the season (https://usfs.app.box.com/folder/50659092031). The paper datasheets should reside with the FBAT Program Manager or STF/Ewell.

Equipment Manager: Responsible to Science Leader

Maintain organization and preparedness of all science-related equipment and supervise the post-assignment process of equipment rehab and equipment readiness for next assignment. Accountable for location, inventory, and readiness of all field equipment.

Organizes and ensures data collection groups have equipment needed to adequately accomplish objectives set forth by science lead prior to every operational shift. Facilitates field equipment cataloging and placement at base camp locations. Makes inventory documentation readily apparent. Ensures adequate stock of consumable/fire sensitive equipment to facilitate equipment rotation and collection of data for duration of incident to meet assignment objectives. In communication with plot THSPs, determines need/level for rehab for equipment returning from field. Flags defective gear.

Notifies Science Lead and may be delegated or delegate acquisition of consumable items or items that need to be repaired or replaced. IMT will sometimes pay for repair or replacement of damaged equipment and replacement of consumables (e.g., rebar, MadgeTech batteries).

Prior to incident demobilization repacks and readies all field equipment to readiness standards to include accurate and detailed labeling and documentation of equipment issues and purchasing/repair needs.

Plot Data Collection Positions (Plot THSPs): Responsible to both Science Leader & Operations Leader

Participate in daily FBAT operations and safety briefing, document daily data objective set forth by science lead. Maintains frequent communication with fire operations leader and/or safety coordinator. Affirms all

group members have assignment-specific safety briefings prior to working in or potentially in immediate fire area. Debriefs science leader daily as needed regarding daily objectives.

Coordinates with Equipment Manager to source required field equipment needed for data collection. Accountable for collecting data safely and accurately. Responsible for the downloading and data entry and transfer of all data collected by each group to the data manager in appropriate format.

Assists Report Leader, Data Manager and Equipment Manager with tasking for completion of daily objectives and data transfer. Reports to Science Leader in absences of assignment.

Fuels inventory group: This is the first squad entering plot area pre/post burn and establishes plot center. Completes surface fuels inventory as per FBAT protocol. Marks all required locations with GPS and ground spike. Photographs transects. Informs remaining plot groups of completion and location of traffic-sensitive areas. Completes post burn surface fuels inventory as per FBAT protocol. Photographs inventory site and recovers all BUT plot center ground spikes. Transfers all collected data to required format and secure all copies of data with data manager.

Canopy inventory group: Completes stand examination as per FBAT protocol for plot area pre/post burn. Transfers all collected data to required format and secure all copies of data with data manager.

*Rate of spread group**:*** Installs rate of spread (ROS) fire arrival sensors in plot area in accordance with FBAT protocol, replace fuels over buried loggers as naturally as possible, minimizes fuel trampling. Records data loggers' location and serial numbers. Responsible for ensuring ROS loggers are separated adequately from heavy fuels and deep duff as so not to destroy the data logger. Marks ROS sensors with GPS, ground spike and hi-visibility indicators. Ensures all ROS data loggers have been launched properly and have sufficient battery life. Post burn, recovers ROS sensors. Coordinates with soils group on pulling loggers and avoids trampling where pre-fire (location of soil temperature stake) and post-fire fuels will be sampled. Leaves marking rebar (or other suitable markers) until soils group has a chance to re-locate locations. Transfers all collected data to required format and secures all copies of files and datasheets with data manager.

Soils group: Manages soil sampling and data collection and soil temperature measurements. Prepares soil sampling gear and coordinates with external partners as needed (e.g. University of Nevada Reno). Launches iButton loggers for soil temperature profile measurements. Sample locations are within 1 m of the ROS sensors and the soils group must coordinate with ROS crew to minimize trampling so that fire spreads normally and pre-fire soil sampling locations can be found post-fire. Recovers soil temperature profile stakes and does a post-fire sample of forest floor and mineral soil.

Fire Behavior group: Installs Fire Behavior Package (FBP), video, and standards (ocular reference poles) in plot area in accordance with FBAT protocols. Verifies video trigger functionality and performs pre-fire data collection. Inspects equipment post-burn prior to striking video and ocular equipment. Documents any changes to equipment position or orientation, recovers all trigger wire and thermistors. Familiar with FBP and camera operation prior to field installation. Ensures all FBP and camera batteries are completely charged and memory cards are cleared prior to field installation. Carries spare FBP and camera setup whenever possible on all plot installation assignments. Completes data collection sheets, and downloads and transfers all data to Data Manager.

FOBS & FEMO Positions: Responsible to Operations and Science Leaders

Responsible to both Science Leader & Operations Leader. Participates in daily FBAT operations and safety briefing, documents daily objective set forth by Science Lead. Maintains constant communication with Fire Operations lead. Accountable for collecting data safely and accurately. The typical assignment will be collecting

standard fire behavior and effects information for incident staff but other, more comprehensive assignments may arise. When a group task is assigned, ensures all group members have adequate assignment-specific safety briefing prior to working in or potentially in immediate fire area. Debriefs Science Lead daily as needed regarding objectives. Coordinates with Equipment Lead to obtain required field equipment needed for data collection. Ensures FOBS/FEMO reports are delivered daily to Data Manager. Reports to Science Lead in absence of assignment.

Fuel Moisture group: Responsible to Operations and Science Leaders

Collects foliage from species of interest and/or woody material at specified locations as assigned by Science Lead in accordance with FBAT protocols and determines their moisture content. Documents collection locations and times and sample condition. Transports samples in appropriate manner as not to corrupt sample integrity and obtains wet and dry weights. Manages sample processing equipment, scale and laboratory oven. Develops plan for completing assignment and keeps Science Leader informed of timeline. Notates potential locations for weather station, monitoring, and plot location. Is proficient in the installation and data collection from FBAT specific weather station. Transfers all collected data to required format and secure all copies of data with Data Manager.

Logistics Manager: Responsible to Operations Leader

Ensures that vehicles are fueled up at the end of the operational period. Responsible for obtaining lunches and drinks for the current operational period. Documents items checked out from Supply Unit. Makes sure all field-going people/vehicles have fireline tools. Ensures that any vehicle issues are taken care of and/or documented. Communicates with Logistics Section to resolve issues with facilities that FBAT uses to work in camp. Resolves parking issues as needed.

AFTER AN ASSIGNMENT

The typical rhythm of an FBAT assignment is to scout and gather intel in the first days of the assignment, focus intensely on getting as many plots installed as possible, pull plots after they burn, work with data and report writing, and then demob and rehab. As the assignment develops and the pace slows, it is sometimes possible to cut people loose for other work on the incident or to return home.

Rehab tasks to complete as the assignment winds down:

- Return FBAT truck to Sonora, CA.
- Rehab gear as needed and separate and flag gear that needs to be replaced or repaired
- Store FBAT gear in ready-to-go condition according to inventory
- Remove AAA and AA batteries from all electronic gear as relevant (because they leak in storage).
- Put paper and electronic copies of data in correct location
- Clear storage devices (e.g., SD cards) as needed and label
- Finalize list for purchasing and repair

Once data are QA'd they are transferred to the FBAT Pinyon (BOX) storage location (Fire Behavior Assessment Team – External). While edited video can be loaded into Pinyon, un-edited video data are kept on harddrives on the STF. The FBAT data have been archived on the USFS Research Data Archive up through 2019. Given available resources in the future, the goal will be to archive data from fires as soon as possible after assignment.

APPENDICES

A - Initial Crew Briefing

Introductions
Goals and Objectives

- Smooth and safe assignment
- Build dataset
- Focus on either tree mortality or burning in fire scar
- Support TLS work
- Support training as possible

Expectations

- Professionalism
- Hard work and pitching in where needed
- Detail orientation
- Safe attitude
- Time coding – get paid for hours we work

Safety and JHA

Preparation the day before we start and daily after field

- Organize gear for next day
- Charge batteries
- Launch loggers (install software)
- Etc.

Morning

- Breakfast 0530
- Briefing 0600 (only leads to breakout)
- Clone radios
- Lunches/beverages/ice
- Supply/Med/etc.
- Crew briefing 0645

Vehicle keys

Roles and responsibilities (add person)

- FBAT Ops Leader
- FBAT Science Leader
- FBAT Squad Boss
- On plots
    - TLS crew
    - Plot center and transect layout
    - Fuels transects
    - Trees
- Camera/Fire Behavior Package
- Rate of Spread

B - FBAT 1 PAGER

The following 1-pager is intended for printing and posting at fire camp or distributing as needed for informational or outreach purposes (e.g., to IMT's and National Forest Staff before fire season.

FBAT Mission: build knowledge about fuels, fire behavior, and fire effects relationships, primarily on wildfires; support knowledge use for fire and land management; and promote firefighter safety and public understanding.

Operations: FBAT is an on-call module focused on coordinated measurements of fuels, vegetation, fire behavior, and fire effects on active wildland fires. FBAT functions in collaboration with land managers, fire managers, and interested research groups. FBAT can be ordered to wildfires through IROC as a list of name requests. Other support comes from Regions, Research Stations, and grants. In coordination with incident management teams, plots are established opportunistically ahead of fires according to objectives, current and expected fire behavior, safe access, and fire management tactics. FBAT's program is described in Fire Management Today (https://www.frames.gov/catalog/43090).

Primary FBAT Objectives:

- Coordinate with fire and land managers and research partners to design and implement applied science projects on active wildfires focused on answering questions critical for meeting agency and stakeholder objectives. A current focus is northern California and meeting information needs of the USFS and Karuk Tribe.
- Continue building a wildfire dataset (started in 2002) for evaluating relationships among fuels, fire behavior, and fire effects and to evaluate related fire and land management decision support systems.
- Supply data and active fire video useful for improving firefighter safety, training, and public understanding.

Measurements:

- Pre-fire: ground, surface, and canopy fuels and vegetation conditions
- Active-fire: video imagery, spread rate, fireline intensity, on-site winds, and energy transport
- Post-fire: ground, surface, and canopy fuel consumption, first-order effects on soils and vegetation

Products:

- Reports and other information delivered on over 30 wildfires (https://www.frames.gov/fbat/publications)
- Science publications evaluating consumption models (https://www.fs.usda.gov/research/treesearch/46373), describing carbon emissions and sequestration (https://www.fs.usda.gov/research/treesearch/57240), and effects of wildfires on soils (https://www.fs.usda.gov/research/treesearch/64929).
- A searchable FBAT video archive: https://www.frames.gov/fbat/fire-videos
- Plot data summaries in the Digital Fire Dictionary: https://www.frames.gov/fbat/datasets-and-summaries

Please contact the FBAT leads for more information or to request FBAT support:

Matthew Dickinson (Lead): 614-556-2271, matthew.b.dickinson@usda.gov

Carol Ewell (Co-Lead): 209-283-4563, carol.ewell@usda.gov

FBAT website: https://www.frames.gov/fbat/home

C - DAILY DATA TASKS

Task	Sub-task	Date____/Init's	Date____/Init's	Date____/Init's
Download	FBPs, cams, & wind maggies			
	ROS maggies			
	Soil iButtons			
Enter, check, and summarize data	Fire behavior (FBPs, video, wind)			
	Fuels			
	Understory			
	Trees			
	ROS			
	Label photos			
Data backup	Scan raw datasheets and backup			
	Backup entered data			
Gear prep	Rehab plot gear			
	Restock plot gear			
	Charge FBPs & cams			
	Format SD cards (FBPs, cams)			
Launch	ROS Maggies			
	Wind Maggies			
	Soil iButtons			
Reporting	Fuels & fire to FBAN/ARA			
	WX for IMET			
	Information for PIOs			

D - FBAT Plot Caution Sign

Take to field to mark plot along access points. Print as needed and place in sleeve located in FBAT truck.

Fire Behavior Study & Equipment

Please do not disturb

- **Site & equip. are intended to burn**
- **CAUTION - trip wires**
- **Thanks from the Fire Behavior Assessment Team (FBAT)**

FBAT Contacts:

Matt Dickinson 614-556-2271 (matthew.b.dickinson@usda.gov)

Carol Ewell 209-283-4563 (carol.ewell@usda.gov)

E - INCIDENT SUPPLY CHECKLIST

Item	Who checked it out and their O-#?	Who used it?	Who returned it?

F - KIT INVENTORY LISTS

On assignment, the FBAT Leader is accountable for equipment which is organized into kits. The FBAT Leader may delegate that task to the Equipment Manager. Use the AD-107 form to document kit contents and accountability. Until FBAT has an Operations Manager, this documentation may not be possible.

Keeping kits the same avoids confusion in preparing for an FBAT assignment, in plot sampling in the field, and in rehabbing during and after assignment.

After the Region 5 tree mortality project, some kits (e.g., FEMO/FOBS Kit 2 and 3) ceased to be maintained. In general, there is a need to update the Kit Inventory Lists, something we intended to accomplish during the training and preparation session in early 2020.

AD-107 (11/89)

United States Department of Agriculture REPORT OF TRANSFER OR OTHER DISPOSITION OR CONSTRUCTION OF PROPERTY		Report No. Date
1. Type of Transaction *(Report Each Type Separately)* ☐ Transfer ☐ Sale ☐ Trade In ☐ Donation ☐ Construction ☒ Temporary Loan Record	2. Authorization Reference	3. Proceeds Received $

4. Reporting Agency USFS	5. Receiving Agency *(Or Name of Purchaser or Donee)* USFS	
A. Organizational Unit Fire Behavior Assesment Team Program Manager	A. Organizational Unit *(Or Address of Purchaser)* Fire Behavior Assessment Team on assignment	
B. Location Sonora, CA	B. Location Sonora, CA	
C. Signature	C. Signature	
D. Title FBAT Program Manager (	D. Title (circle one) FBAT Leader/Equipment Manager	E. Date

6. Property Items

Quantity *(Or Property No.)*	Item Description *(Give Full Details Including Serial Number, If Any, and Condition Code)*	Inventory Value

1	COPY AND PASTE RELEVANT LIST HERE	$4500.00

Certification of Property and Fiscal Officers

7. Property Officer: This transaction is completed and the necessary entries have been made to adjust the Property Records. Proceeds, if any, are to be deposited to:		8. Fiscal Officer A. ☐ The sum indicated below has been received in payment for the property disposed of.	
		Amount ($)	Schedule No.
Signature	Date	Signature	Date

FOBS/FEMO Kit (only one assembled)

UPDATE/CHECK REQUIRED

General

A. 1 Pelican 1620 Case
B. 1 Kestrel 2000
C. 1 Suunto Clinometer w/ Case
D. 2 tripod
E. 1 FSS Belt weather Kit
F. 1 10 x 50 Binocular w/ Case
G. 1 Tatum/ Clipboard
    a. 1 Allen Key
    b. 1 11mm Box Wrench
    c. 1 P1- Driver
    d. 1 Brinno Lend Screw
H. 20ft Wind Hardware Kit
    a. 10 12in Zip Tie
    b. 8 shear Pin
I. 2 Wind Vane & Anemometer
J. 2 30ft RJ-30 (phone) Cord Extension w/ Butt Connector
K. 24 AA battery
    a. 1 Post Level
L. 1 Post Pounder
M. 2 Aluminum Tubes, Set (4)
N. 2 T-Post
O. 2 Old camera boxes with tripods for Brinnos

Specific (with serial number)

A. Kit 1
    a. 1 GPSMAP64st w/ Slip Case & Data Cable Ser. # 3BR055011
    b. 2 Brinno Camera w/ case Ser. # TEH3401741 & TEH3401752
    c. 2 Data Logger H21 USB Ser. # 20108876 & 20098502
    d. 1 Ipad w/ case Ser. # F9FTCYUJHLJJ
B. Kit 2
    a. 1 GPSMAP64st w/ Slip Case & Data Cable Ser. # 3BR056900
    b. 2 Brinno Camera w/ case Ser. # TEH3401760 & TEH3401770
    c. 1 Ipad w/ case Ser. # F9FTD04WHLJJ
    d. 2 Data Logger H21 USB Ser. # 20108877 & 20108878
C. Kit 3
    a. 1 GPSMAP64st w/ Slip Case & Data Cable Ser. # 3BR055013
    b. 2 Brinno Camera w/ case Ser. # TEH3401753 & TEN3401763
    c. 1 Ipad w/ case Ser. # F9FTCL52HLJJ
    d. 2 Data Logger H21 USB Ser. # 20098501 & 20098502

FBP, Camera, and ROS Kits

UPDATE/CHECK REQUIRED

Installation equipment

1. 100 ft Survey Tape for ROS layout
2. Tripod wench kit
3. Two simple clipboards

Gun case contents

Leave fuel transect's rebar on plot for monument purposes. Drive solidly into soil, leaving ≥6 in exposed. Cap for safety. Ocular reference pole paint should be refreshed as needed. Print tag for affixing to gun case.

Gun Case Contents		
Count	**Item**	**Purpose**
1	Rifle case	Carrying
3	Ocular reference poles, 4 ft conduit	For video
3	Long rebar, 3 ft long, ¼ inch to fit inside conduit	For reference poles
1	Tripod anchor w/carabiner & chain	For camera
5	Short rebar, 2 ft long, 1/2 inch diameter	Fuel plot marking + tree plot center
8	Chaining pins, 5 for ROS and 3 for iStakes	ROS cans and iStakes

Black packing bin contents

1. Tag on outside listing contents
2. Heavy aluminum foil and wire for outer wrap
3. Parts for two tripods (3 legs [one adjustable], leg end caps, 4-way junction, top tube with screw and two nuts for affixing instrument box
4. Camera hose bag
    a. Launch plug with two heat-resistant leads
    b. SD card in place (formatted)
    c. Battery (charged)
    d. Thermos cans: 5 ROS cans labeled N, S, E, W, and C each with Thermocouple wire in it
5. FBP hose bag (NOT IN 2021)
    a. Garmin GPS (model ??) with launch cable
    b. MicroSD card (formatted)
    c. Battery (charged)
    d. Anemometer with micro plug (either Type K or copper)
6. Small ammo can or fire shelter cover
    a. 6 spools of wire, each with thermistor on it
    b. 1 extra thermocouple wire
    c. 1 trash bag for ROS hole digging (no dirt mix in litter and duff)
    d. 1 p-cord triangle "jig" for tripod poles
    e. Shelter flagging for ROS rebar marking
    f. 1 roll regular flagging

FBP and Camera protective covers – 2 long plastic boxes

1. 11 camera covers
2. 10 FBP covers

Fuels and Vegetation Kits

UPDATE/CHECK REQUIRED

General

A. 1 Pelican Case 1600
B. 1 Pack Sack
C. 3 100 ft Survey Tapes
D. 1 Magnetic Compass w/ declination adjustment
E. 1 Litter/Duff Knife w/ Sheath
F. 1 Hammer
G. 1 Combination Screwdriver
H. 1 Needle Nose Plier
I. 12 AA battery
J. 1 Densitometer
K. 2 Diameter Tape
L. 1 Tatum w/ 2 Pencil, 2 Pens, 1 Marker, 1 Highlighter
M. 2 Go' No-Go' Gauge
N. 2 short rulers (1ft.)
O. 2 Folding Ruler
P. 2 Ruler 10th in. Protractor
Q. 1 Clinometer W/ Case
R. 1 Roll Hi-Vis Flagging
S. 2 Trash Bag

Specific (with serial number)

A. Kit 1
    a. 1 Garmin MAPgps64st Ser. #
    b. 1 Iphone5S w/ Data Cable Ser. # C39LFCM0FNJJ
    c. 2 Hypsometer (Laser) w/ Case Ser. # 072759 & 093772
    d. 1 Relascope w/ Case Ser. # FM-130
B. Kit 2
    a. 1 Garmin MAPgps64st Ser. # 3BR054988
    b. 1 Iphone5S w/ Data Cable Ser. # C39MVZG8FNJJ
    c. 2 Hypsometer (Laser) w/ Case Ser. # 093758 & 035437
    d. 1 Relascope w/ Case Ser. # 20883

Soils Kit

COMPLETION/CHECK REQUIRED

Soil temperature profile

A. Wood stakes
B. iButtons
C. Software and communication cables
D. Jig for inserting stakes
E. Plastic hammer for inserting jig

Soil sampling gear

A. Sampling frames
B. Rulers
C. Sample extraction tool (AKA spoon)
D. Sample collection containers

ROS Rehab Kit

UPDATE/CHECK REQUIRED

1 Pelican 1500 Case
11 MadgeTech Data Logger Pulse101A w/ Guide
14 MadgeTech Data Logger TC101A w/ Guide
12 MadgeTech Data Logger TC110-2MB
1 MadgeTech IFC200 w/ USB tail & 1/8" Stereo Cord w/ Guide
1 MadgeTech USB w/ USB IFC200 Driver
1 P1 Driver
1 1/8" Flathead Driver
1 Needle Nose Plier
1 Wire Stripper/ Cutter
3 Battery Packs, 14 Units Ea.

FBP, Camera, Anemometer Rehab Kit

UPDATE/CHECK REQUIRED

A. FBP
    a. Charging dock
    b. USB charging plugs
    c. Extra batteries
    d. Extra microSD cards and adaptors
    e. Extra GPS and connection cable
B. Camera
    a. Charging cables
    b. SD cards
C. Tripod
    a. Extra lock nuts
    b. Extra end caps and collars
D. General
    a. Heavy duty food service tinfoil
    b. Wrapping wire

G - TRUCK PACKING LIST

UPDATE/CHECK REQUIRED

General

A. Bed
    a. Generator and fuel
    b. Chocks
    c. Tool purse
    d. Bolt cutter for making rebar plot stakes
    e. Chainsaw kit
        i. Saw
        ii. Bar oil
        iii. Gas mix in dolmar
        iv. Tools
        v. Replacement parts

B. Cab
    a. Windex and paper towels
    b. Plot warning signs and sleeves
    c. AA batteries
    d. FBAT radios
    e. Trash bags
    f. Maps
    g. Flagging tape
    h. Bleach solution for iStake cleaning (to avoid moving microbes around)

Plot gear

A. Backpack with gear from the Fuels and Vegetation Kit

B. iStakes in a ziplock bag for each plot (including launched iButtons) and steel jigs and hammer

C. MadgeTech loggers in a ziplog bag (5 ROS and 1 Pulse for wind)

D. Black packing bins for the day (including camera, wind, and ROS gear)

E. Gun cases for the day (including standard poles, rebar, chaining pins, anchors)

F. FEMO/FOBS gear

G. Line gear and handtools – NOTE: GET FUSEES FROM SUPPLIES AT INCIDENT

I – FBAT LEAD GEAR LIST

A. Printed data collection sheets, this SOP document, and the Protocols.
B. iPads loaded with updated apps/software
C. Harddrive
D. GIS data including FACTS layer (if possible), historical wildfire perimeters and MTBS, LANDFIRE layers, etc.
E. Crew Boss materials (e.g., General Message)

J - PERSONAL PACKING LIST

Your personal gear will differ somewhat between FBAT assignments based at fire camp on a campaign fire and those mostly self-supported at a remote spike camp. In either case, pack as lightly as possible and be prepared to carry all your own gear. Packing lightly is particularly important for remote (e.g., wilderness) assignments because helicopter rides may be required. Assumption is that self-supported hiking and camping (for up to 4 days as for Wildland Fire Modules) will not be required because FBAT will be tied to gear that is not easily transported. FBAT has limited extra gear, please reach out to Program Lead with needs you can't fill from home.

Fire Camp

1. "Red bag" (duffle bag for gear)
1. Line pack (large enough to carry FBAT equipment or, if needed, camping gear) and fire shelter
2. PPE including boots, nomex pants and shirts, hardhat (w/chin strap for helicopter rides), gloves, and eye/ear protection
3. IRPG, Crew Time Report booklet (can get at fire camp)
4. Warm clothes & warm hat for high elevations or late season
5. FBAT t-shirts and cap if available
6. Sleeping gear: tent, sleeping bag, bag liner or sheet, sleeping pad, pillow
7. Red card and government issued credit card (travel card) or other credit card, and $50-100 cash
8. Flashlight with spare batteries
9. Alarm clock
10. Multi tool (a must for working with gear)
11. Lighter
12. Compass
13. Radio/clam shell battery pack
14. Space blanket or rain gear
15. PT clothes/swimsuit
16. Personal Health and Medical Items:
    a. Personal first-aid kit
    b. Prescription medicine for expected length of stay and beyond
    c. Non-prescription medication you expect to need (e.g., ibuprofen)
    d. Sunscreen (15 or higher)
    e. Vitamins
    f. Insect repellent/head net (e.g., Northwoods)
    g. Lip balm, foot powder
    h. Towel
    i. Toothbrush/toothpaste
    j. Tweezers, sewing kit
    k. Shower shoes or flip flops

Additional Items to Consider for Remote Spike Camp

1. Single-person tent and generally lightweight camping gear (line pack large enough to carry)
2. Bio-degradable soap/baby wipes
3. Medication for colds, allergies, diarrhea, athlete's foot, headaches
4. Personal stove (e.g., jet boil), mess kit/cutlery
5. Compact hiking poles
6. Bear spray (can't transport on commercial aircraft)

Special needs (to be included in your Resource Order): laptop for data/writing (optional: tablet for navigation)